TABLE OF CONTENTS

DIS 62
May 2001

ADMINISTRATION

QUESTIONS & ANSWERS

WHAT'S NEW?

Illusion
Systemp
LumaCure Cordless Curing Light

FROM THE LITERATURE

Prime & Bond NT: Laboratory Bond Strength Performance
Not Another Missed Block
Viral Hepatitis A to Z
More News Concerning Estrogen and Resins
Something to Consider for Problem Sealants
Shelf Life of Impression Materials
Packable Resin Composites: Nothing Really New
Clinical Evaluation of Z100 and Scotchbond Multi-purpose Adhesive
Ergonomics and Carpal Tunnel Syndrome
Direct Pulp Capping with a Bonding Agent: Good or Bad Idea?

GENERAL DENTISTRY

62-09 Filtek A110 Anterior Restorative
62-10 VivaStyle Professional Tooth Whitening System
62-11 Illuminé
62-12 Fresh & Go
62-13 Hypo® Intraosseous Needle
62-14 One-Up Bond F
62-15 Clearfil SE Bond
62-16 FujiCem Resin Reinforced Glass Ionomer Luting Cement
62-17 HEM 608 Portable Wrist Blood Pressure Monitor
62-18 Synopsis of Loupes Used in Dentistry

INFECTION CONTROL

62-19 aXcs Air Controlled Sterile Irrigation System
62-20 Magna-Clave Sterilizer
62-21 Aquasafe Water Test Kit
62-22 Millipore HPC Sampler

ADMINISTRATION

62-01 Dentsply Combines Divisions

Dentsply International has announced that it has combined two of its divisions, Preventive Care and Midwest Dental, to form a new division called Dentsply Professional. Among the product lines that will now be handled by the new division are such established brands as Nupro (prophy paste, bleaching products, topical fluoride gel/solution, disposable prophy angles), Midwest XGT high-speed handpiece, Quiet-Air high-speed handpiece, Shorty low-speed handpiece, Cavitron Inserts, Midwest Burs, and Delton Pit & Fissure Sealant.

(Col Charlton)

62-02 Heraeus Kulzer and Jelenko & Co. Announce Merger

On 1 January 2001, Heraeus Kulzer, Inc. (South Bend, IN) and Jelenko & Co. (Armonk, NY), previously independent daughter companies of Heraeus Kulzer GmbH, Germany, merged. The resulting company is known as Heraeus Kulzer, Inc. The company's headquarters will be located in Armonk while its production and distribution facility will be in South Bend. The steps required to effect the merger will be completed by 1 July of this year. The new company will provide products for the both the dental operatory and the laboratory.

(Col Charlton)

62-03 Expiration Date Information for Sybron Dental Specialties/Kerr Products

DIS occasionally receives calls from federal dental service personnel inquiring about the expiration dates of various products. They may have a box of gutta percha points or poly vinylsiloxane impression material that bears no expiration date sticker, and they want to know if the product is still acceptable to use. Although most manufacturers provide expiration dates on their dental products, some only list the date that the item was manufactured. Without knowing for how long the product will adequately function following the manufacturing date, clinicians don t know whether or not the item should be used. At least one manufacturer, Sybron Dental Specialties/Kerr, provides expiration date information for its products on a web page (www.kerrdental.com/ProductCategories/ShelfLife.htm). Hopefully, other manufacturers will follow suit so this type of supply question can be easily answered.

(Col Charlton)

62-04 Confusion in Ordering the A/T 2000XR X-Ray Film Processor

In December 2000, the Air Techniques Company informed DIS that it issued a product information bulletin regarding its A/T 2000XR x-ray film processor, a unit that is frequently purchased by the federal dental services. Apparently, federal service buyers are ordering a model of the unit and, upon receipt, finding that it is not the model they intended to purchase. As indicated in the product information bulletin, there are currently two models of the A/T 2000XR: model 45005 and model 45009. The 45005 is the "standard" model designed to be connected to a plumbed water supply. The 45009 is not connected to a plumbed water system; instead, it has a built-in recirculating water system. The 45009 is intended for field applications where a plumbed water system is not available. Commendably, Air Techniques has taken several steps to assist buyers in determining the correct model prior to purchase. As noted in the bulletin, potential federal service buyers can contact either of the following to determine the correct model for their application:

" Eugene Heil, Air Techniques Government Sales Representative, (828) 698-4660
" Air Techniques Technical Service Department, (800) 247-8324

As an additional step to ensure that buyers are purchasing the appropriate model, the Air Techniques Customer Service Department has instituted a "call back and verify" procedure on all orders for the Recirculating Model 45009.

(Col Bartoloni)

QUESTIONS & ANSWERS

"Questions & Answers" is a feature in which we present and answer the questions we most frequently receive from the field. This month we feature questions about digital radiography, silver recovery, and new light-curing units. Should you want more information about a particular topic, please contact the individual whose name follows the specific answer in which you are interested. If you have a question about a topic not discussed in this issue, feel free to call DIS at DSN 792-7676.

62-05 Products Recently Evaluated by DIS

Question: I enjoy reading the DIS newsletters on the internet, but I miss the DIAL program [the searchable product database] that was included with the newsletters on the CD-ROM you used to send to us. I used it to find out if DIS had evaluated specific products. Is there any way to gain access to that program now?

Answer: When we decided to change from the CD-ROM to a web-based format, this concern was discussed. Based on feedback from the field, we found that the Dental Information Abstract Listing (DIAL) software was not used very often because it was not very user-friendly. We felt that the advantages of moving to a web-based format outweighed the loss of the DIAL program to field users. For example, the web-based format gets information to you faster and more effectively and allows anyone with a personal computer to access the newsletter. DIS is exploring the possibility of incorporating search capability into our website, but in the meantime a listing of recently evaluated products arranged by category can be found by clicking on the "Product List" button on the DIS home page. As always, DIS personnel have access to the DIAL program and are only a phone call or e-mail away.

(Col Leonard)

62-06 Digital Radiography: What can it Do for Dentistry?

Question: I hear a lot of people talking about digital radiography. Exactly what does digital mean, and what is digital radiography? Are there different types of digital radiography and does the technology have any advantages and disadvantages in dentistry?

Answer: Digital technology can be found everywhere today, including the dental clinic. Today's dental practices include the use of digital cameras, digital periodontal probes, digital blood pressure cuffs, digital thermometers, and digital x-rays, to name a few. Digital technology represents efficiency in communication and information. The term digital refers to the special language used by computers called binary language. This language uses the numbers 0 and 1 to translate data entered into the computer, so that the computer can understand the data and treat it through software instructions. The data can be in several forms, including text (practice management software), audio, video, or dental x-ray images.

Recently, dental radiography has significantly changed due to the addition of digital technology. Digital radiography has influenced how dental disease is recognized and diagnosed, because of its ability to enhance images through computer software. To better appreciate digital radiography, dental practitioners need an understanding of its basic concepts, terminology, purpose, use and fundamentals.

Digital radiography records radiographic images, but requires no film or processing chemicals. Rather, it

uses an electronic sensor and a computerized imaging system that produces an x-ray image displayed on a computer monitor. In other words, the patient is exposed to x-rays similar to conventional radiography, but the resultant image is displayed on a computer screen rather than on film. Instead of an x-ray film, a sensor is placed inside the patient's mouth to receive the image information of the exposed area. The x-ray beam strikes the sensor and produces an electronic charge, which is converted to digital information. A computer accepts the image and displays it within moments of exposure as shades of gray on the monitor. The digitized image can be stored permanently, printed, or transmitted electronically (teledentistry) as well. The computer software program can be used to enhance the image to improve its appearance for interpretation and diagnosis. Most software programs can change the following parameters: brightness, contrast, image size (zoom), image orientation, sharpness, inversion (white to black and vice versa), and pseudocolor alteration. In addition, the computer allows for split-screen viewing and image magnification.

One of the positive features of digital radiography is that it requires less radiation than conventional radiography, because the sensor is more sensitive to x-rays than dental film. Exposure times for digital radiography are from 50% to 80% shorter than those for E-speed film. This translates into less radiation exposure for the patient. There are three options available for capturing a digital x-ray image: indirect, direct, and photostimulable phosphor (PSP).

Indirect digital x-ray images are produced by placing a conventional x-ray film on a desktop scanner and allowing a transparency adapter to shine light through the image as it is scanned into the computer. This converts the original analog image (i.e., dental radiograph) into a digital image by scanning. Once digitized, the image can be processed like any other digital image.

To produce a direct digital x-ray image, three components are necessary: an x-radiation source, a sensor, and a computer. The images are captured using a solid-state detector or sensor such as a charge-coupled device (CCD), a complementary metal oxide semiconductor (CMOS), or a charge induction device (CID). Most direct digital systems use a CCD device. CCD, CMOS, and CID sensors are referred to as wired because they are linked by a fiberoptic cable to the computer. The sensor itself is basically a silicon chip with an electronic circuit on it. Sensors range in thickness from 3.2 mm to 8.8 mm. Their actual imaging area is smaller that the outside dimensions and is usually smaller than conventional film. Sensors can be quite expensive. For example, a #2 size sensor (adult periapical) can vary in price from $5,000 to $7,000 (retail). Direct systems are available for intraoral, panoramic, tomographic, and cephalometic images. The images are displayed instantly on a computer monitor.

Photostimulable phosphor (PSP) images are acquired with a reusable plastic plate coated with phosphor. PSP plates are described as wireless because they are not connected via cable or wire to the computer. The plates are similar in every way to conventional intraoral film, including size, thickness, rigidity and placement. Each plate costs from $30 to $50 (retail). The PSP plates store the energy from incoming x-rays, and are then placed in a scanning device (which can cost from$12,000 to $25,000). The scanner stimulates the stored x-ray information by subjecting the plate to a laser light. When the light strikes the phosphor material, energy is released as a light signal in an electronic waveform and is converted to a digital image by the computer. The image can not instantaneously be view on the monitor, but takes from 30 seconds to 5.5 minutes depending upon the system and certain variables. PSP plates are available in intraoral, panoramic, and cephalometric sizes.

All direct and PSP digital radiography systems use a conventional dental x-ray unit. The literature emphasizes that the x-ray unit must have the ability to reduce exposure times to 0.01 seconds to reduce the likelihood of oversaturating the sensor. DIS has determined through clinical trials that most sensors can process clinically satisfactory images at 0.05 seconds depending on the type of sensor and dental x-ray unit.

Many advantages have been ascribed to digital radiography. First, they allow a reduction in the amount of radiation reaching the patient, which is always a concern. Images are displayed immediately on the computer monitor so less chair time is required during diagnosis and treatment appointments. This is a particularly attractive feature for clinicians performing endodontic treatment where several images are

usually made during an appointment. Clinicians also find it useful to be able to manipulate the image because it enhances diagnosis. Image storage and electronic transmission are possible, and patients can be educated about their diagnosis and treatment using the images. Many users appreciate the fact that there is a lot less mess associated with producing digital images than conventional ones, because there is no need for film, film processors, processing chemicals, darkrooms, or film mounts. Of course, no technology is without some disadvantages. Commonly mentioned ones for digital radiography include the high initial set-up cost, the need for staff training, and the bulkiness (i.e., thickness) of the sensors.

Currently there are 16 intraoral digital x-ray systems available in the US, as well as several digital panoramic machines. All digital radiography systems generate images that can be used in the diagnosis and assessment of dental disease. All are capable of providing diagnostically accurate, reproducible images for routine dental tasks including caries assessment, periodontal bone level information, and periapical lesion detection. For more information on digital radiography, please contact DIS.

(Col Bartoloni)

62-07 Silver Recovery from Used Fixer Solution

Question: Why should I be concerned about recovering silver from used fixer solution?

Answer: Silver should be recovered from used fixer solution in dental x-ray processors for economic, resource conservation, and environmental reasons. Silver is considered a hazardous waste. If the concentration of silver entering a sewer system becomes too high, the facility could be in violation of standards set by the publicly owned treatment works (POTW) which receives and processes solutions from the sewer system.

Question: How does the silver recovery process work?

Answer: When radiographs travel through an automatic processor, the fixer solution removes unexposed silver halide crystals from the film. Silver builds up in the fixer solution, typically reaching concentrations in the low thousands of parts per million (ppm). This silver-rich fixer solution exits the processor through a tube leading to a silver recovery cartridge. After the solution passes through the silver recovery cartridge, it typically passes down the drain and into the sewer system. When operating properly, silver recovery cartridges typically used in dental clinics can reduce the silver concentration of used fixer to approximately 5 ppm. There are several technologies available to remove silver from fixer solutions. These include metallic replacement, electrolysis, and precipitation. Metallic replacement is the method most often used for dental processors. This method uses cartridges commonly referred to as metallic recovery cartridges, chemical recovery cartridges, or silver recovery cartridges. The cartridges contain metallic iron (usually present as steel wool) which reacts with the silver. Silver ions in the used fixer are reduced, precipitate as metallic silver, and remain in the cartridge. Iron from the steel wool is oxidized and carried out by the solution.

Question: How do I obtain silver recovery cartridges?

Answer: The best source for information about silver recovery cartridges is the Defense Reutilization and Marketing Service (DRMS). DRMS operates a precious metals recovery program and is the parent organization for local DRMOs (Defense Reutilization and Marketing Offices) located at each base. DRMS will make a recommendation regarding the type of silver recovery unit that a clinic should use based on the quantity of fixer they generate. DRMS may even supply the silver recovery cartridges to the dental clinic for no charge if the clinic generates enough used fixer to participate in the program. Once the cartridge is used, it is turned in to the local DRMO for recycling. Think of DRMS as the supply point for new cartridges and DRMO as the deposit point for used cartridges.

To obtain information on silver recovery cartridges for your facility, call the precious metals recovery branch of DRMS at DSN 932-7293. DRMS will ask for data on quantity of fixer generated, number of radiographs processed, etc. Using this data, they will recommend a specific silver recovery cartridge. Depending on the amount of fixer generated, DRMS may provide the cartridge to the clinic free of charge. If the clinic is eligible for cartridges at no cost from DRMS, the clinic can contact DRMS for a new cartridge each time a replacement is needed. As mentioned earlier, spent cartridges are turned in to the local DRMO for silver recovery.

Question: What are the environmental considerations? Is there a requirement for the silver concentration in the solution exiting my silver recovery cartridge to be below 5 ppm?

Answer: Your local bioenvironmental engineering and civil engineering monitor environmental considerations, but here is some background information. Processing of dental radiographs results in the discharge of silver-rich fixer solution. Silver and silver-bearing materials are regulated by the United States Environmental Protection Agency (EPA). The two primary federal regulations concerning this topic are the Resource Conservation and Recovery Act (RCRA) and the Clean Water Act. RCRA regulates hazardous waste from the time it is generated to the time of its disposal. Liquid wastes (such as used fixer solution) that contain greater than 5 ppm of silver are classified as hazardous wastes under RCRA. This raises the following question: do we have to monitor the silver content of the solution exiting our silver recovery cartridges to be sure that it does not exceed 5 ppm when it enters the drain leading to the sewer? The answer to this question is a conditional no. RCRA contains an provision (40 CFR 261.4[a][1][i&ii]) which excludes wastes that travel through a sewer system to a publicly owned treatment works (POTW) for treatment. If your base is connected to a sewer system that feeds a POTW or FOTW (federally owned treatment works) and you are not collecting and storing the spent fixer on site, you are exempt from RCRA requirements with regard to the used fixer solution. In this case, rather than falling under RCRA standards, your situation will be covered by the Clean Water Act (CWA). The CWA establishes discharge limits from POTWs for various pollutants (including silver). For the POTW to meet its discharge limits, it establishes limits on the wastewater coming into the treatment works. These limits are called pretreatment standards or sewer use codes. The POTW will establish a limit for incoming silver concentration and specify a test point where this limit cannot be exceeded. Typically, the test point is the point where a facility or base's drainage pipes enter the sewer system. Obviously, the silver concentration exiting the silver recovery cartridge will be considerably diluted with other fluids from the facility before it reaches this test point. It would be very unusual for the silver from a dental processor s silver recovery unit to cause a reading that exceeds the sewer use code. Bioenvironmental engineering or civil engineering will work with the POTW to ensure that the limit for silver or any other regulated material does not exceed the sewer use codes. Bioenvironmental engineering may take a baseline reading of the concentration of silver discharged from your dental silver recovery cartridge as well as other silver generating processes in the medical facility so that it knows possible upstream sources in case the POTW s limit is exceeded. In addition to POTW requirements, bioenvironmental engineering should inform you if there are any other locally-generated requirements.

Question: Do I need to use test strips to monitor the silver content of the solution exiting our silver recovery cartridge?

Answer: While not a federal requirement (and usually not a local requirement), there are benefits to using test strips to periodically monitor the solution exiting a silver recovery cartridge. The basic benefit is that while test strips do not provide an exact measurement of silver levels, they can be used as a qualitative test to indicate when your silver recovery cartridge is exhausted and needs to be replaced. One such test strip (Silver Estimating Copper Test Strips, Cat #STF-50) is available from USI International at (262) 334-3000. The retail price is $31.95 for 50 test strips; no government pricing is available.

Bottom line: **Silver should be recovered from used fixer solutions for economic, resource conservation, and environmental reasons. Most clinics process their used fixer solution through silver recovery cartridges rather than collecting the solution and turning it in. Occasionally DIS is asked by federal dental clinics if the Resource Conservation Recovery Act (RCRA) limits the concentration of silver entering a facility s drain to 5 ppm. While silver should be reduced to as low a level as is practical, there is no federal standard (including RCRA) that limits the silver in the effluent exiting a silver recovery cartridge and going down the drain to 5 ppm. The publicly owned treatment works (POTW) to which the water in the sewer system flows to be processed will establish concentration limits for silver and other hazardous materials entering the sewer system. The POTW will establish a sample point for this concentration limit and this sample point is typically at the location where the facility or base plumbing enters the public sewer. It would be very unusual for the effluent exiting a dental silver recovery cartridge to violate this limit. Bioenvironmental engineering can inform clinics if there are any other state or local requirements in this area.**

The precious metals recovery branch of DRMS (DSN 932-7293) can recommend specific silver recovery cartridges based on the quantity of used fixer that a facility generates. Silver estimating strips can be used to monitor the need for cartridge replacement.

(Col Browning)

62-08 Lights of a Different Nature

Question: What is a light diode curing light? Are they better than plasma arc lights for curing composite?

Answer: Recently, several new types of lights have been marketed for curing resin composites and other light-activated materials. Only a couple of years ago, we saw the development of plasma arc curing lights (PAC lights), which are high-intensity light units. Their manufacturers claim they are better than traditional curing lights that use a halogen bulb as the light source because they can cure resin composite in as little as 1 to 5 seconds. PAC lights use a bulb that contains xenon gas and two probes. A voltage potential is created across the probes that ionizes the surrounding gas (plasma), which produces a spark and, in turn, white light. The light is filtered to allow only blue light to pass through the unit's liquid tube. DIS has evaluated two PAC lights, the Apollo 95E (Diagnostic Medical Systems, see *DIS* 58-24) and the ARC Light II (Air Techniques, see *DIS* 61-25). While both units produced light with very high irradiance, neither cured resin composite as quickly as their manufacturers claimed. Also, they are considerably more expensive than halogen units, costing from 3 to 5 times as much. Both lights received a "Marginal" rating from DIS.

The latest development in light curing has been the marketing of units that use light-emitting diodes (LEDs) as their light source. The manufacturers of these units claim they have several advantages compared to halogen lights. First, unlike halogen lights, LED units produce light with a narrow spectral range. The diodes use gallium nitride as a semiconductor and produce light with a wavelength of from 450 to 490 nm and a peak at 460 nm. This is nearly ideal for activating materials that employ camphoroquinone as a photoactivator. The second advantage follows from the first: LED units require less power to operate since they only produce light of a narrow spectral range. As a result, they can be powered with rechargeable batteries. This makes it possible for them to be cordless, portable, and relatively lightweight. Another advantage is the extended life of LEDs. At most, halogen bulbs last a hundred hours or so, while LEDs can last thousands of hours. Also, unlike halogen bulbs and their filters and reflectors, LEDs do not degrade over time, so the light they produce is constant in intensity. Finally, LED lights produce less heat, so there is less potential for gingival and pulpal irritation.

Two caveats need to be kept in mind about LED lights, however. Since LED units produce light of a narrow bandwidth, materials using photoactivators with absorption spectra outside the LED range will not cure properly. Also, users and potential buyers should be aware that LED units produce light with lower irradiance values than halogen or PAC lights. This should not prevent them from adequately curing

light-activated materials, as long as the proper spectral range of light is produced. However, this does complicate measuring their ability to cure resin composite since traditional radiometers can not be used to measure the adequacy of the output.

DIS has begun evaluating commercially-available LED units and will have reports and ratings available for them shortly. In the meantime, as with most products using a technology newly introduced to the dental field, it is probably wise to refrain from purchasing these units until we know how well they perform and how cost effective they are.

(Col Leonard, Col Charlton)

WHAT'S NEW?

"WHAT'S NEW?" features recently-marketed dental equipment and materials. New and innovative products are marketed each month and DIS is unable to evaluate all of them. This section of the newsletter brings these products to your attention. Because DIS has not had the opportunity to evaluate these products, we cannot confirm manufacturers' claims about them. If you would like additional information about the products or are interested in evaluating them, please contact DIS.

Megalloy®EZ is a Dentsply/Caulk's single-composition-spherical amalgam alloy packaged in a new type of capsule. The new capsule has been redesigned to make it easy for users to open it following trituration. The alloy itself has not undergone any changes in composition. Megalloy was rated as "Acceptable" by DIS in 1994 (*DIS 43-09*) when it was originally introduced to the market. The product is available in one-, two-, and three-spill sizes in both 50-capsule and 250-capsule containers. For further information, contact Dentsply/Caulk at (800) 532-2855, (302) 422-4511, (800) 788-4110 FAX, or www.caulk.com.

(Col Charlton)

FlossRx is a vanilla-mint flavored dental floss medicated with stannous fluoride. The manufacturer, Omnii Products, claims the floss's flavor enhances patient compliance and its web-like design improves plaque removal. Each box of FlossRX! contains 30 individual easy-to-open packages, which each contain two 21-inch-long pieces of floss. A box of FlossRX is available for $6.50 (retail) and $5.50 (government) from Omnii Products at (800) 445-3386, (800) 476-7677 FAX, or www.omniiproducts.com.

(Col Charlton)

CavityShield is a xylitol-sweetened 5% sodium fluoride for use as a cavity varnish or for the treatment of dental hypersensitivity. The varnish, from Omnii Products, is packaged in pre-measured, unit-dose wells to which are attached applicator brushes. Three versions are available based on the dentition to which the varnish is to be applied: the Primary Dentition Package contains 32 0.25-mL unit doses, each with a yellow applicator brush; the Mixed Dentition Package has 32 0.40-mL unit doses with red brushes; and the Permanent Dentition Package contains 16 0.25-mL and 16 0.40-mL unit doses with their respective colored brushes. When applying the varnish to the permanent dentition, instructions call for combining the 0.25- and 0.40-mL unit doses. Following application, the patient may immediately be dismissed with the recommendation that he/she avoid eating or brushing for four hours. CavityShield is available from Omnii Products at (800) 445-3386, (800) 476-7677 FAX, or www.omniiproducts.com. Retail and government prices are listed below.

(Col Charlton)

Version	Retail Price	Government Price
Primary Dentition Package	$24.50	$19.95
Mixed Dentition Package	$34.50	$27.90
Permanent Dentition Package	$29.50	$23.85

VaporJet from the Whip Mix Corporation is a high-pressure air/water gun. Its dual action trigger sprays either air or an air/water mixture for cleaning purposes at the technician's workstation, thus reducing trips to the steam cleaner or ultrasonic cleaner. The VaporJet can be used for cleaning dust and slurry from models, removing indicating spray, metal shavings, and porcelain dust. It can also be used to spray impressions with debubblizer before pouring models. It is self-contained and adapts to the air supply at the workstation. A built-in regulator allows you to adjust the pressure to fit different needs. The VaporJet high-pressure air/water gun costs $230.00 (retail) and $155.30 (government) and is available from Whip Mix at (800) 626-5651, (502) 637-1451, (502) 634-4512 FAX, or www.whipmix.com.

(MSgt Osborn)

The **LARK Retractable Safety Scalpel** is designed to protect healthcare workers from accidental percutaneous injuries that can occur with conventional scalpels. The LARK's stainless-steel blade is extended forward and locked into position by depressing the side of the plastic handle and sliding it forward. After use, the blade is retracted by depressing a specific spot on the handle which allows a spring to withdraw the blade into the handle housing. The manufacturer claims that the handle is well balanced and compact. The product is completely disposable, available in blade sizes 10, 11, and 15, and is packaged 20 per box. The LARK can be purchased from Futura Medical Corporation (800) 631-0076 or www.futuramedical.com for $21.00 per box (retail) and $20.00 per box (government).

(Col Bartoloni)

MicroCLEAR is a chlorine dioxide-based dental unit waterline cleaner made for units that have a self-contained water system. The product reportedly reduces bacterial contamination to less than 200 colony forming units per milliliter, which meets the American Dental Association's goal for dental unit water quality. The manufacturer claims that MicroCLEAR is odorless, tasteless, non-irritating, non-corrosive to dental equipment, and does not affect bond strength. The product is designed to be used full-strength initially for overnight application, followed by diluting 1:10 for continuous daily use. MicroCLEAR is available from Rowpar Pharmaceuticals, Inc. at (800) 643-3337 or www.rowpar.com. The product is packaged in two 1-gallon containers with an accompanying pump for $35.00 (retail and government).

(Col Bartoloni)

Model-Tech, from Ivoclar-Vivadent, is a polyurethane-based material used for fabricating precision master models. The product is said to be especially useful for fabricating fixed and implant prosthetic models. Ivoclar-Vivadent claims Model-Tech is easy to mix, eliminates the need for a vacuum mixer, has no offensive order, and is usable for at least 60 minutes. It is compatible with vinyl polysiloxane, polyether, and condensation silicone impression materials. Some of its many purported advantages over die stones include less risk of fracture upon removal from the impression and no setting expansion. Also, since it is resin-based, it maintains margin integrity better, chips less during trimming, and provides a smooth, bubble-free surface against which to wax. Model-Tech comes in an assortment kit, which includes two 100-mL bottles of base material, a 100-mL bottle of hardener, a 450-g tub of filler, and 10-mL of separator. The kit costs $31.00 (retail) and $29.14 (government) and can be ordered from Ivoclar-Vivadent at (800) 533-6825, (716) 691-0010, (716) 691-2285 FAX, or www.ivoclarna.com.

(MSgt Osborn)

Dentronix recently introduced the **DDS 6000 Dry Heat Sterilizer**. The company claims that it is the only dry heat sterilizer that is able to process bagged instruments. Other sterilizers process only unwrapped instruments which means that you must use the instruments immediately after sterilization. Another purported advantage of the DDS 6000 is that it features a programmed cool-down cycle for safety. Dentronix claims that because the sterilizer reduces rust and corrosion, it is ideally suited for sterilizing orthodontic instruments and carbide burs. The DDS 6000 has three cycle times (unbagged, bagged, and trays) which range from 35 to 52 minutes. The operating temperature is 375 F, and the sterilizer is provided in 120V or 220V. The DDS 6000 is available for $3,995.00 (retail) and $3,595.00 (government). For more information, contact Dentronix at (800) 523-5944, (215) 364-8607 FAX, or www.dentronix.com.

(Col Bartoloni)

ImageMax is a new automatic x-ray film processor designed and manufactured by Dental X-ray Support Systems. It is purported to be the first portable, fully self-contained, automatic x-ray film processor designed specifically to follow the Eastman Kodak's film-developing guidelines. An onboard computer makes adjustments to the developing process based on film type, developer temperature, and age of the chemical solutions. As a result, the manufacturer claims that processed x-rays are consistently of high quality. The unit is unusual in that the x-ray film remains stationary while the developing and fixing solutions are delivered to the film. The developer, fixer, and water are situated in their own sealed tank compartments, which is said to eliminate plumbing requirements, chemical odors, and spills. Because the ImageMax lacks rollers, racks, gears, belts, and tracks, maintenance is reduced to a minimum. An optional daylight loader is available. The ImageMax retails from $6,330.00 to $6,530.00 based on model. For government pricing, additional information, and the location of the nearest independent sales representative, contact Dental X-ray Support Systems at (888) 230-9500 or www.dxss.com

(TSgt Sutter)

BendaTwin! a new disposable applicator from Centrix, consists of a 4½-inch-long plastic handle with a brush on each end. The handle is scored in the middle so it can easily be snapped in half to provide two disposable handles and brushes. In effect, two disposable brushes are provided on one handle. One

brush has black nylon filaments and one has white filaments for easy identification when placing different solutions. The neck of the handle near the brush head has an hourglass shape that Centrix claims makes it easy to bend. **BendaMicrotwin** is a similar product except that the ends are tufts of microfibers that Centric claims makes it possible to apply liquids in a precise manner. The handles on each side of the scored middle line have slightly different textures for easy identification when applying different liquids. The products are available from Centrix at (800) 235-5862, (800) 236-8749 FAX, or www.centrixdental.com. Retail and government prices for both products are listed below.

(Col Charlton)

Item	Contents	Retail Price	Government Price
BendaTwin (item #370105)	Box of 200 brushes (100 X 2)	$22.95	$18.95
BendaMicrotwin (item #380020)	Box of 200 brushes (100 X 2)	$14.95	$12.95

The **Kodak Dental Digital Photograph Kit 290** is designed as an all-in-one digital dental photography system. The kit includes the Kodak DC290 Zoom Digital Camera with ring flash, which is said to offer 2.3 megapixel resolution by using an attachable 3X optical lens coupled with 2X digital zoom. Images are viewed and focused on a digital screen on the camera back. Images can be saved in. either .JPG or .TIFF formats to a 16 MB Kodak picture flashcard. The card is inserted into the Kodak Personal Picture Maker PM100 that can print the images without a computer. Also included in this digital photography kit are Dicom Imaging Systems imagExplorer and imagEditor, software that enables the user to manage and manipulate the digital images. In addition to the camera, flashcard, printer, and imaging software, the kit also includes a Kodak inkjet paper sample pack, inkjet cartridge, USB and serial computer cables, rechargeable batteries, and charger. The Kodak Dental Digital Photograph Kit 290 retails for $2695; GSA contract prices are available from the manufacturer. Further information/pricing can be obtained by contacting Kodak at (800) 933-8031 or www.kodak.com/go/dental.

(Lt Col Roberts)

DIFOTI (Digital Imagining Fiber-Optic Trans-Illumination) is marketed by Electro-optical Sciences, Inc. and is said to be the first diagnostic imaging tool for the detection of early caries. The manufacturer claims that DIFOTI is more sensitive than (and can detect incipient caries before) either film or digital radiography. DIFOTI uses a headpiece to project visible white light through a disposable optical device that both transilluminates and captures a tooth image on a charged couple device (CCD) imaging camera. Images can be made that enable the clinician to view the lingual, facial, interproximal, and occlusal surfaces. Image acquisition is accomplished by software that is said to be self-calibrating. The images are transferred to a computer hard drive where they are stored for viewing on the monitor. The DIFOTI system includes the system handpiece, control box, software, image capture card, foot pedal, and 50 disposable mouthpieces. The DIFOTI system requires a computer with at least a 100-MHz Pentium processor, 4 GB hard drive, 64 MB RAM, Video Card with 4 MB RAM, open PCI slot, and plug-and-play compatible backup device. The DIFOTI system retails for $10,000; government pricing is currently being negotiated. More information can be obtained from Electro-optical Sciences at (800) 729-8849, (914) 591-3783, (914) 591-3785 FAX, or www.DIFOTI.com.

(Lt Col Roberts)

Heliomolar HB is a high-viscosity, visible-light-cured, reinforced microfill composite resin marketed by Ivoclar-Vivadent. It is recommended for the direct restoration of Class I and Class II preparations. Heliomolar HB is designed to provide the same Heavy Body clinical handling consistency and high compressive strength of posterior hybrid and microhybrid composites while, at the same time, exhibiting the high-gloss finish and esthetics of a microfill. Ivoclar-Vivadent claims it uses the same resin technology that it uses in Heliomolar RO, but notes that Heliomolar HB's thicker consistency is due to a modification to the size of the prepolymers plus the addition of a patented rheological modifier. Ivoclar-Vivadent does not recommend bulk placement and curing but says that a two-millimeter thick layer of the product can be adequately light cured in only 20 seconds. Heliomolar HB is available in nine shades and is packaged in syringes or unit-dose capsules (Cavifils). Heliomolar HB is available for $265.00 retail and government cost is $113.53 from Ivoclar-Vivadent at (800) 533-6825, (716) 691-0010, (716) 691-2285, or www.ivoclarna.com.

(Lt Col Roberts)

Extra-oral Adjuster by PerfectFit, L.P. is purported to be a device that enables the dentist or assistant to adjust a crown s proximal and occlusal contacts prior to insertion. The EXTRA-ORAL ADJUSTER works with single units and short-span bridges that fit between the posts of the device. To use the adjuster, a resin coping is first made on the master die. At the insertion appointment, the coping is seated on the prepared tooth and proximal and occlusal registrations are made by adding composite resin to the coping. The coping and registrations are then removed from the mouth and placed on the master die which has previously been mounted in the adjuster using dental stone. Proximal and occlusal indexes are made from the registrations using more composite resin. The restoration (e.g., crown) is then seated on the adjuster where adjustments are made to the proximal and occlusal surfaces. The manufacturer claims that this device has several advantages compared to the usual intraoral adjustment process. First, it allows for easier and quicker adjustment. Second, proximal contacts can be adjusted one at a time, thereby reducing the chance of open contacts. Finally, it is said to reduce dentist time because an assistant can perform the adjustment procedures. More information about the product and its use can be found at www.perfectfitlp.com. The Extra-oral Adjuster is available from PerfectFit, L.P. at (888) 785-4700 for $299.99 (retail). Information about government pricing can be obtained from PerfectFit L.P.

(MSgt Osborn)

Diamond Quartz by Hi-Tec Dental Products is a polyurethane-based master model die material. The company claims that the product contains a special filler that provides the most accurate reproduction of dies and models possible without any expansion. It is said to have hardness and stability that make it an ideal choice for implant cases, lower anteriors, and special problem cases. Diamond Quartz has a catalyst, base, and filler that is hand mixed in equal ratios and poured into the impression. No vibrator is said to be needed during pouring. One significant advantage claimed for Diamond Quartz is that its high abrasion resistance enables the technician to maintain marginal integrity throughout the fabrication process. Also, the smoothness of the material purportedly eliminates the need for a separator when fabricating porcelain margins. Diamond Quartz comes in a kit that contains 480 mL of catalyst, 480 mL of base, and 450 g of filler. The kit costs $85.95 (retail) and $68.76 (government). Diamond Quartz can be ordered from Hi-Tec Dental Products (800) 859-2006 or www.hi-tecdental.com.

(MSgt Osborn)

Bingo-1020 Wet/Dry Apex Locator from Dent Corp is a portable microcomputer-controlled apex locator. The unit uses two connectors to obtain its measurements: one attached to a clip placed on the patient s lip and the other attached to the endodontic file. Dent Corp claims that the unit is capable of measuring in 0.1-mm increments and operates accurately regardless of root canal condition (e.g., dry, or wet with blood, purulence, etc.). The Bingo-1020 uses a proprietary algorithm called ROOT WIZARD to track the file and display its position on a 3 inch by 2 inch liquid crystal screen. The unit also displays an enlarged graphic of the apex that indicates the location of the file tip relative to the end of the root. Audible signals sound when the apex is approached, and a warning tone indicates an overinstrumented apex. The Bingo-1020 has a two year warranty and costs $799.00 (retail) and $640.00 (government). It is available from Dent Corp as (800) 454-9244, (914) 682-6600, (914) 948-1711 FAX or www.dentcorp.com.

(MSgt Belde)

The **Concorde II** is a specially-designed high-volume suction tip from the Roeko Company. Roeko claims that a flange around the end of the tip enables clinicians to retract soft tissues while suctioning. The tip is made of high impact plastic that purportedly can withstand 100 autoclave cycles at 273 degrees F. Its matte finish is said to prevent light reflectance. The tip comes in two different sizes: one has a connector diameter of 11 mm and the other has a diameter of 16 mm. A box of 10 tips costs $21.95 (retail and government) and can be ordered from Roeko USA at (888) 665-0411, (626) 256-0411, (626) 256-0422 FAX, or www.roeko.com.

(MSgt Belde)

FastTray LC is a light-cured acrylic used for fabricating custom trays. The material is supplied as soft, pre-formed sheets in a lightproof, plastic container. To make a custom tray with FastTray LC , a wafer is adapted by finger pressure to a spaced diagnostic model, trimmed to remove excess, and then light cured using a light box. (Bosworth sells a light box or a Triad® (Dentsply/Trubyte) light unit can be used.) Instructions call for curing FastTray LC in the Bosworth light box for 3 to 5 minutes; Bosworth claims that the Triad® unit requires only 15 seconds. The trays are said to be easy to trim and can be used immediately after fabrication. A box of FastTray LC contains 50 wafers in one of three colors (blue, pink, white) and costs 85.00 (retail) and $56.12 (government). It is available from the HJ Bosworth Company at (847) 679-3400, (847) 679-2080 FAX, or www.bosworth.com.

(Col Charlton

Illusion is a new dual-activated resin cement from the Bisco Company. The product is recommended for luting porcelain and composite veneers, crowns, inlays, and onlays. A syringe of Clear catalyst paste is provided along with three syringes of base paste (one each of shades Clear, Milky, and Opaque) and corresponding try-in pastes. This cement is different from other currently-available resin cements in at least two respects. First, its esthetics are based on translucency and opacity instead of traditional shades. Bisco claims that the three shades (Clear, Milky, and Opaque) can be changed using a Light-Cured Color Modifier Paste so that any desired shade can be achieved. This is purported to reduce the number of individual shades that need to be in the kit and minimizes waste when seldom-used shades become expired. Illusion is also different in that it contains a bottle of Light-Cured Viscosity Modifier that allows clinicians to alter the viscosity of the mixed cement for different clinical uses. Other cements usually offer two different viscosities of catalyst paste to make the mixed cement thin or thick. Bisco claims the cement has a film thickness of 20 microns. A kit of Illusion also includes bottles of enamel/dentin etchant, porcelain etchant, porcelain primer, composite primer, and Bisco s fifth-generation (i.e., one-bottle) bonding agent, One-Step. A kit can be purchased for $310.00 (retail) and $263.50 (government) from Bisco at (800) 247-3368, (847) 534-6000, (847) 534-6111 FAX, or www.bisco.com.

(Col Charlton)

Systemp is a light-activated temporary restorative material purported to be easy to place and remove. It is specifically recommended by Ivoclar-Vivadent, its manufacturer, for temporizing inlay and onlay preparations. The kit contains an inlay version that has high elasticity and an onlay version said to have low elasticity. The inlay version is used for temporizing inlay preparations as well as preparations with minor undercuts. It can also be used to reline polycarbonate crowns and bridges. The onlay version is used to temporize large or shallow, less retentive preparations. Each version comes in a universal and a transparent shade and can be purchased in syringe or capsule (Cavifil) form. Systemp also comes with a bottle of Systemp Desensitizer (a solution of 5% glutaraldehyde and 35% polyethylene glycol dimethacrylate) that is claimed to seal exposed dentin tubules and reduce sensitivity. Instructions call for placing the desensitizer prior to temporizing with Systemp. According to Ivoclar-Vivadent, Systemp can be bulk filled in thicknesses up to 5 mm and is adequately light activated with a 20-second exposure to a suitable halogen light unit. Removal requires only an explorer or other suitable instrument. The Systemp Intro Cavifil Package (item # 559597AN) contains 20 Cavifils (5 each of inlay transparent, inlay universal, onlay transparent, onlay universal) and one bottle of Systemp Desensitizer. It can be purchased for $58.50 (retail) and $17.56 (government) by contacting Ivoclar-Vivadent at (800) 533-6825, (716) 691-0010, (716) 691-2285 FAX, or www.ivoclarna.com.

(Col Charlton)

LumaLite, Inc recently introduced the **LumaCure Cordless Curing Light**. The light utilizes light emitting diode (LED) technology to generate light tailored with a wavelength between 400 and 500 nm, peaking at 470 nm. This wavelength best activates the photoinitiator, camphoroquinone, found in most light-activated composites, adhesives, and bonding agents. The company claims that LEDs provide thousands of hours of consistent light output as opposed to the 50 hours of bulb life seen with conventional halogen curing lights. The lightweight, portable unit (4 ounces) is powered with Ni-MH (Nickel-Metal-Hydride) rechargeable batteries that are reported to provide up to 200 exposures per charge. When not in use, however, the light is returned to its charging station which keeps the batteries fully charged between uses. Due to wavelength-specific LED technology, the manufacturer reports a 2-mm depth of cure for most composites in as little as 10 seconds. The LumaCure includes: the handpiece, interchangeable/rotatable 7-LED array, 90° curing tip, battery charger stand, power supply, instruction manual, 50 disposable sheaths, resin tester disk, and carrying case. The unit is priced at $1795.00 (retail); $1616.00 (government). Further information is available from LumaLite, Inc. at (619) 660-5410 and www.luma-lite.com.

(Col Leonard)

FROM THE LITERATURE

Periodically, articles appear in the literature that present clinically useful information or evaluate the performance of a material or piece of equipment. Because DIS believes that this type of research is of value to clinicians, we present a brief description of these articles to make you aware of them. The complete citation is provided so you can obtain the article if you are interested in reading it in its entirety.

PRIME & BOND NT: LABORATORY BOND STRENGTH PERFORMANCE

In vitro efficacy of a one-bottle adhesive system with three restorative materials. Baghdadi ZD. Gen Dent 2000;48:694-699.

"One-bottle" or "fifth-generation" dentin bonding agents have been on the market for several years, and a number of laboratory studies have been done assessing their performance. Some results indicate they may be more technique sensitive than multi-component products. This study evaluated the bond strength of one fifth-generation product, Dentsply/Caulk's Prime & Bond NT, when used to bond three types of restorative materials to dentin. Three groups of 10 extracted third molars were ground to expose dentin and treated with Prime & Bond NT. The following materials were then placed against the teeth using a cylindrical mold: Surefil (a packable resin composite); Dyract AP (a compomer); and Dispersalloy (an admixed amalgam). After 24 hours storage in distilled water, the materials were debonded using a testing machine. Results indicated that the packable resin composite and compomer bonded to the dentin with comparable bond strengths (13.6 and 13.2 MPa, respectively). Their bond strengths were significantly greater than that of the amalgam (5.9 MPa). A majority of failures for the SureFil and Dispersalloy groups were adhesive, while a majority of the Dyract AP failures were mixed (adhesive and cohesive). No fractures within the dentin were observed for any of the groups. **The author concluded that Prime & Bond NT provided moderately good bonding of the resin composite and compomer to dentin.**

NOT ANOTHER MISSED BLOCK

Accessory innervation of the mandible: identification and anesthesia options. McKissock MD, Meyer RD. Gen Dent 2000;48:662-669.

The literature reports that up to 20% of initial mandibular blocks result in less than profound anesthesia. This may be due to many different factors including: clinical error; the presence of inflammation/infection; the type, volume, and potency of anesthetic solution; needle deflection; hematoma formation; and psychological factors. If all of the classic signs of anesthesia are present but the patient still complains of sensation from one location, accessory innervation may be the primary cause. Accessory innervation of the mandible is defined as innervation provided by any nerve to the mandibular dentition and surrounding tissues other than the inferior alveolar nerve in its conventional course. The authors of this article states that several studies have found that accessory foramina are common in the mandible and are likely entry points for accessory nerves. They review the nerves that provide accessory innervation through these foramina, and suggest injection techniques to achieve anesthesia. **This article is extremely helpful in understanding mandibular accessory nerves and how to anesthetize them. It may prove to be a valuable tool for clinicians faced with a successful block that fails to provide profound anesthesia.**

VIRAL HEPATITIS A TO Z

Recent advances in the treatment of viral hepatitis. Little JW. Gen Dent 2000;48:672-679.

This article reviews the most recent studies on viral hepatitis that are of special interest in dentistry, with an emphasis on those published in the last five years. It discusses the epidemiology of hepatitis viruses, their risk of transmission in dentistry, and the steps to be taken to avoid their transmission. **The author emphasizes that the use of universal precautions and the hepatitis B vaccine have reduced the risk of transmission of viral hepatitis in dentistry.**

MORE NEWS CONCERNING ESTROGEN AND RESINS

Estrogenicity of fissure sealants and adhesive resins determined by Reporter Gene Assay. Taurmi A, Imazato S, Narimatsu M, Matsuo M, Ebisu S. J Dent Res 2000;79:1838-1843.

Some research suggests that restorative resins may release chemicals that mimic the endocrine effects of estrogen. This study investigated the estrogenic activities of three pit and fissure sealants (Delton, Dentsply/Ash; Defender, Henry Schein; and Teethmate-F1, Kuraray) and five adhesive resins (Linerbond 2V liquid A and Linerbond 2V liquid B, Kuraray; Scotchbond Multi-Purpose, 3M; OptiBond Solo,

Kerr; and All Bond 2 D/E, Bisco). Estrogenic activity of the resins was measured using reporter gene assay, which measures the biochemical response (enzyme production) of a standard cell culture to estrogen compounds. **Results found that resins in Delton and Defender pit and fissure sealants demonstrated estrogenic activity from bis-phenol A dimethacrylate (BPA-DMA). However, the amount of BPA-DMA eluted from these sealant materials exhibited less activity than the maximum acceptable concentrations established by the US Environmental Protection Agency.**

SOMETHING TO CONSIDER FOR PROBLEM SEALANTS

Improved sealant retention with bonding agents: A clinical study of two-bottle and single-bottle systems. Feigal RJ, Musherure P, Gillespie M, Levy-Polack M, Quelhas I, Hebling J. J Dent Res 2000;79:1850-1856.

Treating caries-susceptible pits and fissures with resin sealants enjoys wide acceptance as a preventive dentistry strategy. However precarious, recently-erupted teeth are difficult to keep from being moisture contaminated and, as a result, sealants placed in them have a higher failure rate. This five-year, split-mouth clinical study involved the placement of 617 occlusal and 441 buccal/lingual sealants with half the sealants being placed with dentin bonding agents (DBAs) and the other half placed without them (control). Teeth were isolated with cotton, acid etched, and either third-generation DBA primers (Tenure Primer, Den-Mat; Scotchbond Multi-Purpose, 3M) or fifth-generation DBAs (Tenure Quik, Den-Mat; Single Bond, 3M; Prime & Bond, Dentsply/Caulk) were placed and simultaneously cured with the sealant material. Use of the fifth-generation (i.e., single-bottle) DBAs improved sealant retention 50 percent for occlusal sealants and 33 percent for buccal/lingual sealants. Tenure primer (Den-Mat) had no effect on sealant retention compared to the control while Scotchbond Mult-Purpose primer was detrimental to sealant retention. **Results of this clinical study suggest that the use of fifth-generation (i.e., single-bottle) dentin bonding agents may increase sealant retention and survival in situations with less-than-optimal moisture control.**

SHELF LIFE OF IMPRESSION MATERIALS

Changes in properties of nonaqueous elastomeric impression materials after storage of components. Hondrum SO. J Prosthet Dent 2001;85:73-81.

Clinicians are often curious about the wisdom of using dental materials once they are beyond their expiration date. This study evaluated the properties of various nonaqueous elastomeric impression materials to determine how long they retained their properties. The impression materials chosen for this study were: a polyether (Impregum F, Premier); a polysulfide (Permlastic, SDS/Kerr) in light-, medium, and heavy-body consistencies; and an addition silicone (Reprosil, Dentsply/Caulk) in putty, light-, medium-, and heavy-body consistencies. One batch of the impression materials was stored under recommended temperature and humidity conditions, and samples from this batch were also shipped to various military facilities around the world for storage under ambient conditions. Material was returned for testing from these facilities at predetermined intervals during the 72-month test period. Eight physical properties were tested, including viscosity, working time, setting time, dimensional stability, and tear energy. Results over 72 months indicated changes in viscosity, working/setting times, elastic recovery, and creep compliance. The polysulfide and the addition silicone materials also showed separation of components. **The author concluded, however, that most batches of the materials and consistencies remained efficacious well past their 1-or 2-year designated shelf lives. Data for the addition silicone changed little during the test period, which indicated that this material was quite storage stable.**

PACKABLE RESIN COMPOSITES: NOTHING REALLY NEW

Properties of packable dental composites. Choi KK, Ferracane JL, Hilton TJ, Charlton D. J Esthet Dent 2000;12:216-226.

Packable resin composites are resin restorative materials that are claimed by their manufacturers to be easier to place and more advantageous to use than standard composites for the restoration of posterior teeth. Some of the manufacturers, in fact, claim that these products can be used as amalgam substitutes. At least one product is packaged with an amalgam carrier, and most have instructions saying they can be placed in thicknesses of up to 5 mm and light cured. This study evaluated selected physical and mechanical properties of five packable resin composites and compared them to those of traditional composites, a hybrid (Z100, 3M) and a microfill (Heliomolar RO, Ivoclar Vivadent). The researchers measured the inorganic filler content by volume, fracture toughness, flexure strength and modulus, Knoop hardness, polymerization shrinkage, radiopacity, and depth of cure of 2-mm and 5-mm thickness specimens. The packable composites tested were: ALERT, Jeneric/Pentron; Pyramid Enamel, Bisco; Pyramid Dentin, Bisco; SureFil, Dentsply/Caulk; and Solitaire, Heraeus Kulzer. Results indicated that all of the packable resin composites had fracture toughness and flexural moduli similar to those of the nonpackable resins. Their polymerization shrinkage was equal to or greater than that of the nonpackables. Most could be cured in a 2-mm thickness, but none was adequately polymerized when

placed in a 5-mm bulk thickness. All of the packables but Solitaire were adequately radiopaque. Finally, the packable composites had flexural strength values lower than that of Z100. **The researchers concluded that the physical and mechanical properties of the packable resin composites were similar to those of the two nonpackable resins tested. It is expected that their clinical performance will be comparable to that of the nonpackables. The major advantage for some packable resins is their thicker consistency, which makes it easier to achieve acceptable interproximal contacts.**

CLINICAL EVALUATION OF Z100 AND SCOTCHBOND MULTI-PURPOSE ADHESIVE

Four-year clinical evaluation of posterior resin-based composite restorations placed using the total-etch technique. Narciso Baratieri L, Ritter AV. J Esthet Restor Dent 2001;13:50-57.

Many researchers believe that the ultimate and most meaningful studies of dental materials are those assessing the materials' performance under clinical conditions. Unfortunately, because these studies are expensive and take a long time, few are reported. This study was a retrospective evaluation of the clinical performance of a hybrid resin composite (Z100, 3M) and a dentin bonding agent (Scotchbond Multi-Purpose Adhesive, 3M) used to restore posterior teeth. One of the two researchers placed Class I and II restorations in posterior teeth using Z100 and Scotchbond MPA over a one-year period. A total etch technique was used when applying the dentin bonding agent. Only vital posterior (molar or bicuspid) teeth were restored, and no large restorations (i.e., those whose buccolingual occlusal isthmus width exceeded 2/3rds of the buccolingual intercuspal width) were placed. All margins were in enamel, and the restorations were in occlusal contact. At baseline (1 to 2 weeks postoperatively), 1 year, 2 years, 3 years, and 4 years, the restorations were assessed for color match, marginal adaptation, anatomic form, cavosurface marginal discoloration, axial contour, interproximal contact, postoperative sensitivity, and secondary caries. Modified Ryge criteria were used for evaluating the restorations. At the 4-year point, 726 restorations were assessed. Results indicated that at baseline, 24% of the restored teeth exhibited sensitivity. At four years, all teeth tested vital and the shade, axial contour, interproximal contact, and marginal adaptation all received 100% alpha scores. No secondary caries was found, and none of the restorations required replacement. A small percentage (2.5%) exhibited clinically detectable margin fracture and 6.5% had observable cavosurface margin discoloration. **The authors concluded that under the controlled conditions of this study, Z100/Scotchbond MPA had the potential to have a high four-year success rate when used to restore posterior teeth.**

ERGONOMICS AND CARPAL TUNNEL SYNDROME

Prevalence of carpal tunnel syndrome and median mononeuropathy among dentists. Hamann C, Werner RA, Franzblau A, Rodgers PA, Siew C, Gruninger S. J Am Dent Assoc 2001;132:163-170.

Carpal tunnel syndrome (CTS) affects individuals who perform intensive or repetative work with their hands, including dental healthcare workers. CTS is characterized by numbness, tingling, or pain in areas of the hands innervated by the median nerve of the hand. Primary involvement is seen with the palmar surface of the thumb, index and middle fingers. Risk factors for CTS include repetitiveness of work, forceful exertions, mechanical stress, poor posture, high temperature, and excessive vibration. In this study, the authors attempted to quantify the prevalence of CTS symptoms among dentists as compared to the general population. The researchers used several methods including a self-reported symptom questionnaire as well as an objective assessment of the health of the median nerve with standardized electrodiagnostic testing. Over 1,000 dentists were screened during the American Dental Association s Annual Health Screening Program in 1997 and 1998 as part of the study. **Results showed that the prevalence of CTS symptoms in the dominant hand of dentists was higher than that in the general population. However, when electrodiagnostic confirmation was added, the prevalence of CTS was found to be nearly identical to that of the general population. Individuals with diabetes, rheumatoid arthiritis and obesity were more likely to have a median mononeuropathy.**

DIRECT PULP CAPPING WITH A BONDING AGENT: GOOD OR BAD IDEA?

Response of human pulps capped with a self-etching adhesive system. de Souza Costa CA, Lopes do Nascimento AB, Teixeira HM, Fontana UF. Dent Mater 2001;17:230-240.

Direct pulp capping has been a procedure employed for many years in dentistry. Typically, calcium hydroxide has been the material of choice for this procedure because studies have shown that pulpal health and dentin bridge formation result when it is used. Despite this positive clinical track record, some clinicians have begun using resin materials to cap the exposed pulp following total acid etching. Several animal studies have shown encouraging results. This study evaluated human pulpal responses following direct pulp capping with a self-etching bonding agent and compared it to that observed following the use of calcium hydroxide. Thirty-three sound human premolars had their pulp tissues mechanically exposed. Pulps were capped with Clearfil Liner Bond 2 (Kuraray) or calcium hydroxide (Pathfinder Associates), and the cavities were filled with Z100 resin composite (3M). After 5, 30, and 120-300 days, the teeth were extracted and processed for microscopic examination. Results indicated that over the

short-term, Clearfil Liner Bond 2 elicited a mild-to-moderate inflammatory pulpal response. Over time, a chronic inflammatory condition developed which inhibited pulpal repair and subsequent dentin bridge formation. On the other hand, the calcium hydroxide-capped teeth showed an initial organization of pulpal cells under a layer of coagulation necrosis. Over time, pulpal repair was observed with complete dentin bridge formation. **The authors concluded that calcium hydroxide remains the material of choice for direct pulp capping.**